

WHAT IS CLAIMED IS:

1. A system for unstrapping and unsleeving a tray, comprising:
a tray-transport configured to transport a tray in the system;
a strap cutter configured to cut a strap on the tray;
a strap-removal portion configured to remove the strap cut by the strap cutter;
and
an unsleeving station configured to remove a sleeve from the tray;
wherein the unsleeving station is configured to remove the sleeve from the tray
after the strap-removal portion removes the cut strap.
2. The system of claim 1, wherein the tray-transport comprises a tray-sizing
station configured to determine the size of the tray.
3. The system of claim 2, wherein the tray-sizing station comprises at least
one sensor configured to determine the height of the tray.
4. The system of claim 3, wherein at least one sensor is a photo-reflective
zone sensor.
5. The system of claim 3, wherein at least one sensor is a contact arm
microswitch.

6. The system of claim 2, wherein the tray-sizing station comprises at least one sensor configured to determine the length of the tray.

7. The system of claim 6, wherein at least one sensor is a photo-reflective zone sensor.

8. The system of claim 6, wherein at least one sensor is a contact arm microswitch.

9. The system of claim 1, wherein the tray-transport comprises a traffic control device configured to regulate tray traffic in the system.

10. The system of claim 1, further comprising a sleeve-transport conveyor configured to move empty sleeves.

11. The system of claim 1, further comprising a safety enclosure configured to protect personnel from injury during system operation.

12. The system of claim 1, further comprising a control system configured to control and monitor the system.

13. The system of claim 12, wherein the control system comprises a computer.

14. The system of claim 1, further comprising at least one emergency stop switch configured to stop the system.

15. The system of claim 1, wherein the tray-transport comprises a powered roller.

16. The system of claim 15, wherein the powered roller is a zero-pressure accumulation conveyor.

17. The system of claim 1, wherein the tray-transport comprises a mail catcher configured to catch loose items.

18. The system of claim 1, wherein the tray-transport comprises a tray centering guide configured to center the tray.

19. The system of claim 1, wherein the strap-removal portion comprises a vacuum takeaway.

20. The system of claim 1, further comprising a transfer device configured to push the destrapped tray onto the unsleeving station.

21. The system of claim 1, wherein the strap cutter comprises a rotating saw blade and a flexible spatula.

22. The system of claim 1, wherein the strap cutter comprises a hooked blade and a flexible spatula.

23. The system of claim 1, wherein the strap cutter is configured to cut the strap above the tray and the strap-removal portion is configured to remove the cut strap below the tray.

24. The system of claim 1, wherein the strap-removal portion is configured to remove the cut strap near the center of the cut strap.

25. The system of claim 1, wherein the strap-removal portion comprises a strap chopping portion configured to chop the cut straps.

26. The system of claim 1, wherein the unsleeving station comprises a sleeve-expander configured to lift the top of the sleeve.

27. The system of claim 26, wherein the sleeve-expander comprises a gripper configured to grip the top of the sleeve.

28. The system of claim 27, wherein the gripper comprises vacuum cups.

29. The system of claim 1, wherein the unsleeving station comprises a push ram configured to push the tray out of the sleeve.

30. The system of claim 1, further comprising a sleeve-sorting station configured to sort empty sleeves.

31. The system of claim 30, wherein the unsleeving station comprises a sleeve-transport conveyor configured to transport empty sleeves to the sleeve-sorting station.

32. The system of claim 30, wherein the sleeve-sorting station comprises at least one container.

33. The system of claim 32, wherein the sleeve-sorting station further comprises at least one sleeve-ejector configured to sweep empty sleeves into the at least one container.

34. The system of claim 33, wherein at least one sleeve-ejector comprises at least one pusher paddle configured to flatten the empty sleeve before sweeping the empty sleeve into the at least one container.

35. The system of claim 32, wherein the sleeve-sorting station comprises a floor fixture configured to position the container.

36. The system of claim 32, wherein the sleeve-sorting station comprises a basket-full sensor configured to sense over-height stacking of the empty sleeves in the container.

37. The system of claim 29, wherein the push ram comprises a sweeping device configured to remove loose mail from an empty sleeve.

38. A method for removing a sleeve from a tray, the method comprising:
providing the system of claim 1;
cutting the strap from the tray with the strap cutter;
removing the cut strap with the strap-removal portion; and
removing the sleeve from the tray with the unsleeving station.

39. The method of claim 38, further comprising operating and monitoring the system with a control system.

40. The method of claim 38, further comprising sorting the empty sleeve with a sleeve-sorting station.

41. The method of claim 38, further comprising chopping the cut strap with a strap chopping portion.

42. A device for destrapping a strapped sleeved tray comprising:

a strap cutter having a flexible spatula and a cutting blade next to said flexible spatula, said flexible spatula insertable between a strap and a sleeve over said strapped sleeved tray; and

a strap take-away system below said strap cutter.

43. A device for shipping and routing items, the device comprising:

a tray-transport for receiving a strapped sleeved tray, said tray-transport including sensors for determining tray-size and sleeve size;

a destrapping station including a strap cutter and a strap take-away system;

an unsleeving station including a sleeve-expander and a ram, said unsleeving station separating said sleeves from said trays;

a sleeve-transport conveyor, wherein said sleeve-transport conveyor receives sleeves from said unsleeving station; and

a sleeve-stacking station, wherein said sleeve-stacking station sorts said sleeves according to sleeve size determined by the sensors into a plurality of containers.

44. A method for separating a tray from a strap bound sleeve comprising the steps of:

receiving a strapped sleeved tray at a tray-transport station;

sizing said strapped sleeved tray at a tray-sizing station;
destrapping said strapped sleeved tray with a strap cutter;
removing said tray from said sleeve; and
sorting said sleeves according to size.